

# The Ohmsett Gazette

Leonardo, New Jersey

Testing · Training · Research

Spring/Summer 2013

## High Viscosity Offshore Skimmers Tested

**N**OFO (The Norwegian Clean Seas Association for Operating Companies) administers and maintains oil spill preparedness on behalf of all the oil producing companies on the Norwegian Continental Shelf. As part of their effort to improve the equipment available to the responders, they are evaluating viable skimming technologies capable of recovering oil of very high viscosities. Three commercially available skimmers were subjected to very demanding quantitative and qualitative performance testing at Ohmsett over 15 days in January 2013.

According to Hans Jensen, head of Research and Development, NOFO issued an invitation for tenders to provide additional skimmer capabilities for six NOFO offshore recovery systems. As a result, the three skimmers tested in January were the Lamor LFF100, the Desmi Giant Octopus, and the Framo HiVisc 150 Skimmer Head. All three skimmers are hydraulically operated and fitted with thrusters, which allow them to be remotely maneuvered.

"The objective for the Ohmsett trials was

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## "Ice Month": Testing in Arctic Conditions

**R**ecovery of oil in ice presents unique challenges while conducting safe and effective oil spill response operations. While response equipment and techniques that are designed to contain and recover oil spills from vessels, pipelines, as well as exploration and production facilities in offshore Arctic regions exist, there remains a need for testing and evaluation to determine how well they perform. To meet this need, the Bureau of Safety and Environmental Enforcement (BSEE) sponsored "Ice Month" at Ohmsett from February 18 - March 15, 2013.

During this unique event, mechanical response equipment currently used or being evaluated for use by the U.S. Navy, U.S. Coast Guard, and oil spill removal organiza-

tions, was tested in the tank under various simulated Arctic conditions using refined oil.

"The objective was to test various skimming systems in oil/ice conditions," said Kristi McKinney, Oil Spill Response Research specialist for BSEE. "This was a great opportunity for the Navy and the Coast Guard to test their equipment and look at other equipment for use in the Arctic environment."

During the first week of testing, the U.S. Navy Supervisor of Salvage and Diving (SUPSALV) evaluated equipment currently in their inventory which included the Slickbar DIP 400, Desmi SeaMop, and the Lori Mini. For demonstrations during the second

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Ohmsett technicians Allen Cannone and Dave Knapp prepare the tank by placing ice sheets of various sizes in the test area of the tank.



## Ice Month: Testing in Arctic Conditions

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and third weeks, Navy representatives requested that Elastec and Lamor bring additional equipment to evaluate for potential purchase. Elastec brought the X30 Grooved Disc, TDS118G Grooved Drum, and the Magnum 100G Grooved Drum skimmers. Lamor brought the Multimax (LAM) 50 and Oil Recovery Bucket (LRB) skimmers.

“The Navy-owned skimmers selected for testing are currently used in the Alaska response region. Demonstrations of the new arctic-specific equipment brought in by vendors also proved to be a valuable tool for selection of future capabilities for the U.S. Navy,” stated Stephanie Brown, pollution equipment lifecycle manager for SUPSALV.

During the final week of Ice Month, the U.S. Coast Guard National Strike Force Coordination Center brought the Desmi DOP DUAL with the Helix brush adaptor for evaluation and requested Desmi bring the Polar Bear skimmer for evaluation.

“Over the past two and a half years since the Deep Water Horizon spill response, the Coast Guard has been focusing on evaluating the need for and developing an Arctic oil spill response capability for skimming oil-in-ice,” said Mike Crickard, logistics management specialist for the USCG National Strike Force Coordination Center. “Partnering with BSSE during Ice Month enabled us to test the suitability and effectiveness of our Desmi DOP DUAL with Helix brush adaptor skimming system.” According to Crickard, the DOP DUAL is designed to be deployed off the USCG JUNIPER Class WLB Buoy Tenders which have reinforced hulls for operating in ice.

The test protocol was an adaptation of ASTM F631 and F2709-08 and designed by Ohmsett’s engineering staff in conjunction with SL Ross Environmental Research Ltd. of Ottawa, Canada, a consulting firm specializing in oil spill research.

Ohmsett personnel prepared ice conditions in the test tank by installing a chiller to maintain the tank water at 35° F, and placing eight-inch thick sheets of sea-ice in various sizes to simulate a broken ice field of either 30% or 70% ice coverage. The 30% ice coverage was selected based on previous testing as the amount of ice that begins to

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**The U.S. Navy-owned Slickbar DIP 400 skimmer being tested in 30% ice coverage during Ice Month demonstrations.**



**The Lori Mini brush skimmer being tested in 70% ice coverage. The Lori Mini and Slickbar DIP 400 are currently used by the U.S. Navy in the Alaska response region.**



## Ice Month: Testing in Arctic Conditions

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inhibit skimmer performance and 70% as the maximum coverage that a skimmer would be able to operate.

“As the percentage of ice on the water increases, it hinders skimming operations. We found that bigger is not necessarily better in terms of maneuverability and actual skimming efficiency,” commented Crickard.

During the tests, the skimmer equipment was placed within a boomed area in the tank that was preloaded with ice and a one-inch layer of Hydrocal 300 oil. The equipment started skimming the oil and ran until one third of the oil had been removed. A total of three tests were performed for each skimmer. The last test in each series continued for an extended period to determine how the skimmer’s performance changed as the slick thickness diminished in removing the top one third of oil, the middle third, and ideally the last third.

According to Brown, the U.S. Navy gained valuable experience operating their skimmers in oil and ice and had the opportunity to optimize techniques for the most efficient clean-up in ice infested waters.

For the USCG, the initial test results of recovering oil in various ice conditions with the DOP DUAL fitted with the Helix brush adaptor are promising. “Some additional tests and adjustments to system components will be completed over the next few months in order to harden-up the current system design, making it ready to distribute a system to each National Strike Force Strike Team as a 'ready-load' system for operational deployment,” stated Crickard.

The findings will be used to help improve mechanical response technologies, and to initiate the development of standards for the assessment of equipment recovery capabilities and efficiencies when used in broken ice environments.

**Top: The U.S. Navy’s Desmi SeaMop being tested to optimize techniques for clean-up in ice infested waters.**

**Bottom: The U.S. Coast Guard’s DOP DUAL fitted with the Desmi Helix brush adaptor is tested for use in oil and ice recovery operations**



# NOFO High Viscosity Offshore Skimmers

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to provide a basis for a comparative technical and operational evaluation of the three skimmers for NOFO mode of operation, which means that the skimmer will operate in a boom and has to transfer recovered product nearly 100 meters to the oil recovery vessel,” explained Jensen.

The Lamor LFF100 is a high capacity free-floating skimmer designed for open ocean oil recovery operations. It has two



**Lamor LFF100 tested in the stationary mode.**



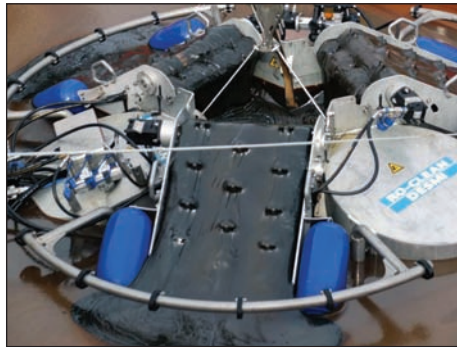
**Lamor LFF100 advancing in oil.**

V-chain pocket brush type conveyors for collecting a wide range of floating oil from light to viscous oils and emulsions. Each brush chain conveyor consists of four brush chains.

The Desmi Giant Octopus high capacity skimmer features a collection system of 15 belt/brushes configured in three, splayed brush rail banks which allow the skimmer to recover oil from any direction.

The Framo Transrec HiVisc150 skimmer uses a hydraulically operated shovel drum located in the front end of the skimmer to lift the oil from the sea surface and deposit it into the pump well.

NOFO required that each of the skimmers



**Desmi Octopus tested in the stationary mode.**



**Desmi Octopus advancing in oil.**

be able to: recover highly viscous oils, have a minimum capacity of 100 cubic meters per hour, be self-propelled with good maneuverability, operate and recover oil while attached to a 90 meter umbilical hose assembly (the assembly included transfer hose for recovered product, hydraulic power hoses, and signal cabling), and demonstrate wave following characteristics.

To evaluate these requirements, three types of tests were conducted: mobility, nameplate capacity, and roving capabilities.

A series of mobility tests took place the first week of the project to determine umbilical influence, pull forces, sea keeping abilities, and maneuverability. In the first series, using the long umbilical, the skimmers were timed as they travelled 200 feet down the test tank to calculate the speed with the drag of the umbilical. The second series was a qualitative evaluation of the skimmer behavior in various wave patterns with the umbilical both perpendicular to the waves as well as along the waves. The final series measured the maximum force exerted by the

thrusters to maneuver the skimmers through the water (bollard pull).

During the second week of testing, the skimmers were evaluated in the stationary mode using the ASTM F2709-08 Standard Test Method for Determining Nameplate Recovery Rate of Stationary Oil Skimmer



**Framo HiVisc 150 Skimmer Head tested in the stationary mode.**



**Framo HiVisc 150 Skimmer Head advancing in oil.**

Systems. The skimmers were placed in a boomed area within the tank with a preload of test oils of a sufficient depth so that the collection device encountered oil only. The skimmer recovery rate was determined using a medium and heavy viscosity oil as an average of two repeated tests.

For the third week of evaluations, the skimmers were deployed with the umbilical in a large boomed area of the test tank to compare performance of the skimmers when maneuvering inside the boom area to recover high viscosity oil and transferring it through the long umbilical to a holding tank. Using a heavy test oil, the skimmer was positioned in a boom set in a “J” configuration, similar

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# Spill Technology Based on a Shaving Process

In the wake of Hurricane Sandy and the massive cleanup efforts to reopen Ohmsett, HUSEN AS of Norway returned to test the OilShaver the week of November 26, 2012. The high seas oil collection system shaves the oil spill off the surface of the water before it is exposed to the turbulence created by the collec-

tion device. The recovered oil is channeled into a containment area at the end of two long boom pontoons where it forms a river at the collection unit that contains a skimmer and a hydraulic pump.

The OilShaver was previously tested in November of 2010 to collect performance

measurements and was a contestant in the Wendy Schmidt Oil Cleanup X CHALLENGE during the summer of 2011. Since then, the HUSEN team has made design modifications to the oil collection system to enhance recovery performance and wanted to evaluate the system in similar conditions as 2010 tests. "The present configuration is a far cry from the initial efforts of four years back," commented Ingvar Huse, designer of the OilShaver. "The system is now firmed up in a stable form ready for a market release later this year."

According to Huse, the main modifications to the system are skis under the leading boom designed to counteract entrainment, and a skimmer in the collection unit to reduce water content in the oil. "This configuration was tested at sea without oil, but the need to do a controlled oil test necessitated a revisit to Ohmsett."

The objective of the week-long project was to evaluate oil loss as a function of towing speeds of 3 and 4 knots. "This is a high speed system, and a towing speed below 3 knots is only applied in highly adverse weather conditions," said Huse.

The OilShaver was tested under calm conditions and in regular waves to document its performance in terms of wave conformance and recovery. During the test series, using medium weight oil, the OilShaver encountered an oil slick created on the water's surface ahead of the system. Its throughput efficiency (expressed as a percentage) was calculated by the amount of oil recovered divided by the amount of oil encountered.

Huse commented that the detailed results of the test have not been completely analyzed. However initial evaluations indicate the need to redesign the water flow and the physical configuration of the collection unit, as well as apply a larger skimmer.

"The OilShaver system is now in its last year of development. It will be presented to the press and other interested parties at a launch event in Stavanger, Norway in the last quarter of 2013," stated Huse. "Before that, it is going to participate in the NOFO Oil-On-Water Exercise in the North Sea in June."



**The HUSEN OilShaver is a high seas oil collection system that shaves the oil from the surface of the water.**

## NOFO High Viscosity Offshore Skimmers

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to the actual application a recovery vessel uses during response operations. In addition, there was an evaluation of the water injection systems, which are used to reduce the friction of the viscous oil going through the transfer hose.

"Testing of large skimmers with high viscosity oils at Ohmsett during winter conditions with wind combined with low air temperatures certainly offered some challenges, especially since all the tests had to be designed from scratch or adopted to the operational conditions

at the facility," commented Jensen. "The tests identified considerable variations in the skimmer properties and capabilities, far beyond what could be revealed from comparison of specifications alone. The technical evaluation and comparison for NOFO mode of operation proved relatively easy, and hence the objective of the testing was fulfilled. Finally the NOFO staff attending was very satisfied with the testing as a learning experience."



# Oil Recovery Vessel Features an Automatic Recovery System

For more than 14 years, Qingdao Sunic-Ocean Marine T&S Co., Ltd of China has been committed to providing technical solutions for responding to marine oil spills along the coastal regions of China. In their continued efforts to provide the most innovative technology for response operations, Sunic-Ocean Marine has developed an advancing oil recovery system that includes a Dynamic Inclined Belt (DIP), which was designed by JBF in the 1970s, that can be installed inside of an oil recovery ship or independently operated to recover spilled oil as a Vessel of Opportunity Skimming System (VOSS).

What makes this prototype skimmer unique is its combination of four existing technologies currently in use: the Sunic-Ocean Marine DIP belt skimmer, an induction pump to help pull the water through the system, a sensor controlled vacuum recovery system to concentrate the layer of oil into a tower, and an automatic recovery system (ARS) that enables a more efficient recovery process.

"The advantage of this ARS system is that

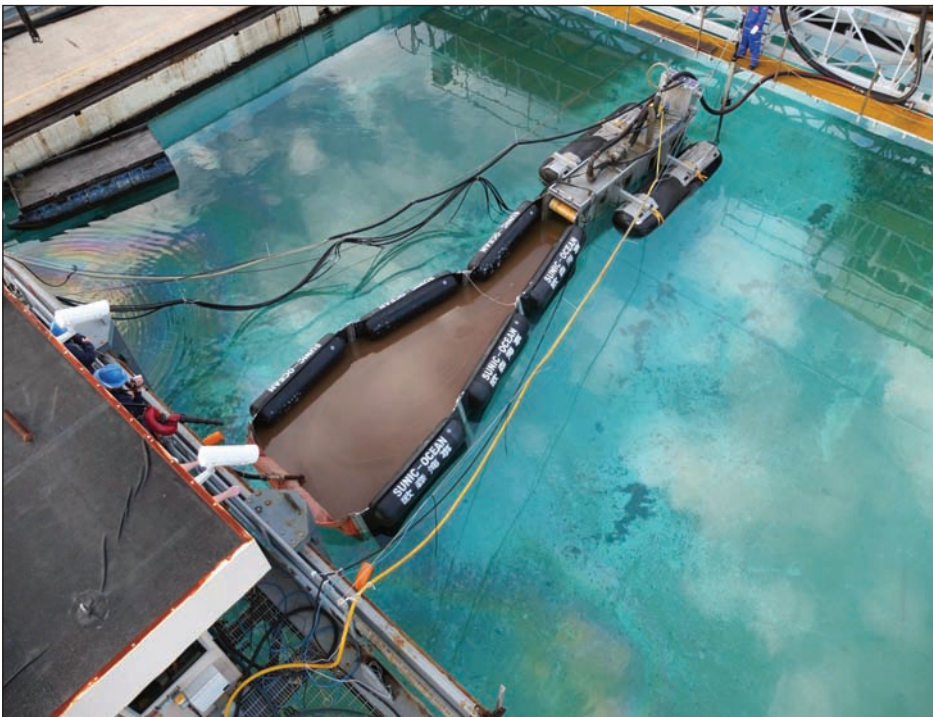
it can eliminate mistakes which are caused easily by the skimmer operators during real oil response operation process – no matter during the day or night, in calm or rough sea state, with the operator trained or not," commented Mr. Sun Zhihui, manager of Sunic-Ocean Technical Department.

The Sunic-Ocean team started developing the system in 2010 after providing on-site maintenance support to their customers during response operations for China's biggest spill incident in Dalian. During skimming operations the team noticed multiple equipment challenges that led to more water than oil being skimmed, pump failures that stopped skimming operations, and fatigued response personnel. "All these problems make the skimming operation efficiency very, very low; far less than the skimmer specifications," said Mr. Sun Zhihui. "After this experience, we decided to develop a reliable skimming system which will skim and recover the floating oil automatically, and ensure the ideal and dependable oil recovery performance of the skimmer."

After nearly two years of research and development, Sunic-Ocean Marine completed the design and manufacturing of the new system. In early December of 2012, they brought the system to Ohmsett for performance testing. During testing, the team collected the first test data and identified areas for improvement, such as the speed of the inducing pump and the relative ratio between the rotational speed of the incline belt and the advancing speed of the skimmer.

Once the modifications were made, the team returned to Ohmsett the week of January 7-11, 2013 to continue their performance testing with different skimming speeds, wave conditions and oil types. Secured with rigging between the Main Bridge and Auxiliary Bridge, the system was tested in advancing mode through an oil slick created on the water surface. The tests were run with two types of oil, Hydrocal (light to medium oil) and Calsol (heavy oil). Oil Recovery Efficiency, Oil Recovery Rate, and Throughput Efficiency were calculated at the end of each test run.

With more than 20 test runs, the members of the Sunic-Ocean Technical Department were pleased with the data, which they felt demonstrated that the system met the initial design demands. "The professional facilities, standard test procedures, and the accurate recording of the test results really helped the whole test process," said Mr. Sun Zhihui. "It is really helpful for us to understand the performance of our equipment. I am glad that we made a right decision to bring our system here."



The Sunic-Ocean Marine Vessel of Opportunity Skimming System went through 20 performance testing runs in the Ohmsett tank.

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## News Briefs

### U.S. Coast Guard Class C OSRT Training

The U.S. Coast Guard Oil Spill Response Technician Course (OSRT) provides Coast Guard personnel with both classroom and hands-on training using oil spill response equipment systems onboard JUNIPER Class (SORS) and District DRAT/ National Strike Force vessel of opportunity equipment. The course includes actual oil spill recovery and viscous oil transfer using a variety of Coast Guard oil recovery systems.

During their training at Ohmsett April 30 - May 3, 2013, the students rotated through five deck stations: Half Hull Rigging, Pumping/Skimming Station, Boom Deployment, Temporary Storage Device, and Skimming exercises in the Ohmsett tank in calm and wave conditions.

The next USCG training session will take place at Ohmsett in July..

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### 3D at Depth R&D

3D at Depth LLC. of Boulder, CO. is dedicated to underwater imaging solutions using a patent pending technology. They tested their latest system at Ohmsett the week of April 22-26, 2013. The test was conducted using proprietary underwater laser technology to survey and image various targets.

### HALO Sea Guardian Test

HALO Maritime Defense Systems (HMDS) develops sea barriers to mitigate small boat attacks, providing critical security to the Navy, energy sector, shipping industry, and commercial facilities. In the past HMDS conducted tests at Ohmsett with their Sentinel Barrier system. HMDS returned to Ohmsett for two weeks in April 2013, this time to test their Guardian Barrier system.

The Guardian Barrier system is fabricated from composite materials to resist the corrosive effects of salt water and to withstand virtually any sea state. The objective of this test was to evaluate the performance of a half-scale barrier in simulated marine conditions.

### OHMSETT is a Smoke-free Facility

Our company is committed to providing a safe and healthy environment for employees, customers, and visitors. MAR Incorporated's policy is that there is no smoking on the premises of the Ohmsett Facility or Naval Weapons Station Earle. There will be no exceptions to this policy and no area designated a smoking area. We appreciate your full cooperation with this new policy.

### Congressional Staffers Observe Ice Month Tests

On a cold brisk day in March, a delegation from the House Natural Resources Committee, Senate Energy Committee, the office of Senator Mark Begich, and the Bureau of Safety and Environmental Enforcement (BSEE) Congressional Affairs Office visited Ohmsett to observe Ice Month testing.

BSEE Oil Spill Response Research Specialist Kristi McKinney gave a presentation on recent research projects conducted by BSEE. Of particular interest to the group, was the cold weather testing projects. In addition, Ohmsett Senior Test Engineer Alan Guarino gave a presentation on the testing and research conducted at the facility.

After the presentations, Guarino provided a tour of the facility which included the onsite oil/water lab. There he talked about the oils and dispersants used during research experiments conducted at Ohmsett.

Afterwards, they gathered on the Main Bridge to observe the U.S. Coast Guard's test of the DOP DUAL with Helix Brush adaptor skimmer.



**During Ice Month, a congressional delegation gathered on the Main Bridge to observe skimmer equipment tests.**





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